DOCUMENT RESUME

ED 439 744 JC 000 251

AUTHOR	Ryland, Jane N.
TITLE	Technology and the Future of the Community College. New Expeditions: Charging the Second Century of Community Colleges. Issues Paper No. 10.
INSTITUTION	Association of Community Coll. Trustees, Annandale, VA.; American Association of Community Colleges, Washington, DC.
SPONS AGENCY	Kellogg Foundation, Battle Creek, MI.
PUB DATE	2000-00-00
NOTE	9p.
AVAILABLE FROM	Community College Press, P.O. Box 311, Annapolis Junction, MD 20701-0311. Tel: 800-250-6557 (Toll Free). For full text: http://www.aacc.nchc.edu/newexpeditions/White Paper/technologywhite.htm.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Community Colleges; Computer Uses in Education; Distance Education; *Educational Change; Educational Strategies; *Educational Technology; Educational Trends; *Long Range Planning; *Student Educational Objectives; Student Needs; Two Year Colleges

ABSTRACT

This document explores the current environment from which community colleges are charting their paths to the future, with an emphasis on technology as an empowering force for change. It includes an overview of the current higher education environment, emphasizing that much of the demand comes from new markets of learners of all ages, motivated by career changes, and personal interests and developments. To a lesser extent, the public in general values the traditional post-high school educational experience, and increasingly views it as less relevant. Today's learners demand that education be cost-effective and that education be customized to the individual learner. They expect the time, place, and pace of education to be at the convenience of the learner. They have less interest in gaining mastery of a predetermined volume of content than they have in learning work-related skills that will measurably enhance their employment and earning prospects. This paper summarizes relevant trends in technology such as: networks; convergence of voice, video, and data; knowledge navigation; computers; mobile computing; smart cards; distributed computing; open systems; middleware; reliability and ease of use; and neoelectronic applications. It suggests strategic implications for community colleges and offers recommendations for strategic directions by looking at learner-centered education, active learning, community involvement, financing strategies, technology organization, and technology planning. (VWC)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 439 744

NEW EXPEDITIONS
Charting the Second Century of Community Colleges
a W. K. Kellogg Foundation Initiative

Issues Paper No. 10

Technology and the Future of the Community College

Jane N. Ryland

President Emerita, CAUSE

ABSTRACT

This paper explores the current environment from which community colleges are charting their paths to the future, with an emphasis on technology as an empowering force for change. It includes an overview of the current status and relevant trends in technology, then suggests implications for community colleges and recommendations for strategic directions.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

D. D. Carey

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

INTRODUCTION

Community colleges, along with the entire higher education community, are truly setting forth on a new expedition into the 21st century. It is striking that the factors fueling a transformation of our education system are converging just as we embark into a new millennium.

Current Higher Education Environment

In today's environment, we are seeing an increase in demand for higher education. The higher education community, however, should not be misled by this phenomenon, because this demand has a much different character from that to which we've become accustomed in the past:

- Much of the demand comes from new markets of learners of all ages, motivated by career changes, personal interests, and personal development.

ED 439 744

BEST COPY AVAILABLE

- The public in general values to a lesser extent the traditional post-high school educational experience, and increasingly viewed it as less relevant; indeed, the high level of public support education once enjoyed has eroded somewhat.
- Today's learners demand that education be cost-effective.
- Today's learners demand that education be customized to the individual learner rather than provided in lockstep with students of varying preparation, learning style preference, and expectation.
- Today's learners expect the time, place, and pace of education to be at the convenience of the learner, not the provider, to facilitate balancing work, family, and personal demands with learning.
- Today's learners have less interest in gaining mastery of a predetermined volume of content (much of which will soon be obsolete as new content is generated) than they have in learning work-related skills that will measurably enhance their employment and earning prospects, and learning how to work collaboratively, find needed information, think critically, and use technology in their work.

Traditional education providers face significant competition from new entries in the market, including for-profit competitors who, unfettered by artifacts of traditional education environments, offer and market education alternatives tied neatly to the new demands.

The new environment of today reflects a huge increase in the availability of information, much of it poorly organized, unauthenticated, and of little value.

Technology Trends

Not many years ago, technology barely surfaced onto the radar screen of the typical college president, perhaps rightly so as issues of reduced funding levels and spiraling costs took precedence. More recently, however, in the process of seeking solutions to economic problems, presidents remembered the oft-repeated promises by information technology managers and corporate marketing that technology would reduce costs while enhancing quality and access. Quickly, technology rose to the top of presidential lists, presenting the opportunity to prove what had long been promised.

But technology should not drive the strategic direction for any college. Rather, technology should be assessed with regard to its potential for helping achieve a college's strategic goals.

Several trends dominate today's technology environment. Community colleges seeking an appropriate yardstick for evaluating specific technology choices may want to consider the extent to which the specific technology contributes to advancing these trends. Today's seemingly "hottest" solution will pale before tomorrow's innovation, so maintaining flexibility will continue to offer high value in any technology planning.

Networks

Without doubt, the network has emerged as the single most important technology trend, because of its ability to facilitate communication with colleagues as well as with information resources. Few of us in the early days of computers would have predicted that the biggest contribution of computers would not be in expanded processing capability but in communication instead. The network facilitates both synchronous communication, where learners and teachers participate in the learning experience at the same time if not the same place, and asynchronous communication, in which barriers of time and place disappear.

Universal connection by means of networks forms a basic premise of the technology environment of today and tomorrow. Every computer, whether on a desktop, in a laboratory, or in a briefcase or pocket, will need to have the ability to connect to a network, and all networks should ultimately interconnect.

The universal acceptance of standard network protocols such as the Transmission Control Protocol/Internet Protocol (TCP/IP) on which the Internet is based, contributed heavily to the rapid proliferation of the Internet as the mechanism for network interconnection. This protocol will most likely continue to mature and prevail as the networking protocol of choice.

Today, many of the network connections traverse physical infrastructures of optical fiber, copper wire, or coaxial cable. Increasingly, however, these connections can occur without the use of wires, occurring instead by means of infrared, satellite, and

microwave wireless transmissions. Nicholas Negroponte, Director of the Massachusetts Institute of Technology's Media Laboratory, noted that the protocols for personal communications and broadcast communications have begun to shift. Personal communications such as telephone conversations, previously transmitted over wire, now use wireless transmission, and broadcast communications such as television, previously transmitted in the air, are moving to wired or cabled transmission.

Convergence of Voice, Video, and Data

We soon will see a continuation of the intermingling of all such forms of information reduced to indistinguishable digital bit streams, then stored, accessed, and transmitted over the network, including voice and video interfaces, intermixed with keyboarded text.

Knowledge Navigation

Today's environment finds us at the very early stages of understanding how to manage and navigate through the huge volumes of information and knowledge being made available electronically through the World Wide Web on the Internet, reminiscent of the early days of libraries before the emergence of a Dewey Decimal or Library of Congress classification system. We can expect to see significant enhancements in this area as tools become available to facilitate classifying, tracking, and finding the needed information.

Computers

Technology will continue to give us faster and more powerful computers of all sizes and types, from the personal computer to the server at the department or institution level to the supercomputer. Technology will continue to accelerate the cost-effectiveness of smaller, lighter, and more powerful computing and communication devices, all of which will be easily connected to the network. However, the average price for such computing and communication capability will not likely decrease. Instead, the current trend of greatly increasing capability and power at the same price level—and requiring those increased levels of power just to accomplish basic tasks—will continue.

Mobile Computing

Parallel to the trend to universal networking runs a trend to mobile computing. The utility of computing and communication increases significantly with accessibility. We more readily use personal desktop computers than shared computing resources in laboratories; we more readily use laptop computers than desktop computers; and we more readily use notebook or palmtop computers than heavier laptop computers. In short we most readily use the resource closest at hand.

Smart Cards

Smarts cards simply represent an extreme example of mobile computing that opens a wide range of new application possibilities. Capable of carrying user-specific information, typical smart card applications include authentication, authorization, security, and financial transactions.

Distributed Computing

Ubiquitous networking will make possible increasing transparent distribution of all components in the process, an extension of today's client-server computing. Parts of databases and information resources will reside apart from modular processing components, all appearing to the user as if locally resident.

Open Systems

Open systems standards will increasingly form the basis for technology architectures of the future with hardware and software components meeting specifications for functionality and interface, and allowing seamless interchangeability of components regardless of vendor. Today, open systems initiatives have extended to learningware, with EDUCAUSE's National Learning Infrastructure Initiative (NLII) already developing a set of Instructional Management System (IMS) standards in conjunction with corporate partners for all aspects of learning systems, from storing and access course content to tracing student performance.

Middleware

Middleware encompasses many of the behind-the-scenes capabilities that allow systems to operate smoothly and transparently, including such functions as authenticating

and authorizing specific users for access to specific resources and ensuring secure communication. Early computers, expensive resources generally shared by a stable and known set of users, soon included full functionality for authorization, authentication, security, backup, and recovery. But with a global and rapidly growing population of users with the capability to connect to resources anywhere on the Internet, all these capabilities must be revisited. Today, we have done little more than acknowledge the need for middleware; in the future, we can expect to move to seamless incorporation of such capabilities across the network.

Reliability and Ease of Use

Those of us who work with technology often find ourselves susceptible to technophoria. We see the emergence of fledgling, rough-edged technologies and capabilities and immediately make the mental leap of seeing them in ubiquitous use (for example, for technology-enabled learning), seamlessly integrated into and instantaneously enhancing our lives. In fact, technology today remains largely difficult to use and suffers from unreliability. We interface with technology primarily by means of the keyboard, with rudimentary offerings appearing for voice, handwriting, and video interfaces. The hurdles of reliability and ease of use continue as perhaps some of the most difficult to overcome in achieving technology's promises, but we will ultimately overcome these hurdles. We can expect continued enhancements in these areas in the years to come, including seamless, automatic transitions between voice and written communications. In the meantime, adoption of simple, more mature technologies such as electronic mail can provide benefits more quickly than jumping suddenly into attempts at widespread asynchronous delivery of courses on the Web.

Neoelectronic Applications

Paul Evan Peters, the founding Executive Director of the Coalition for Networked Information, often characterized our current technological environment as the paleoelectronic age, an era in which we simply redo current practices using new technological capabilities, often with little or no improvement. However, he saw us moving rapidly into a mesoelectronic age, in which we would begin to experiment with new modes of operation as technology gives rise to innovation. He saw a relatively lengthy transition period to the neoelectronic age, where truly new and as-yet-unimagined applications of technology will change our lives. An example of such a transition was the paleoage automobile turn signal (an automated replica of an arm emerging from the car window), followed by the mesoage turn signal (a light at the end of the arm), followed finally by the neoage turn signal (the light moved to the rear of the automobile). Some of our experiments today in using technology to enhance teaching and learning, such as replacing lectures with passive electronic video recordings of the same lectures, reflect the paleoelectronic era of today. This natural technological evolution, however, suggests a lesson to be learned in avoiding disappointment at the marginal success of early applications of technology, recognizing these instead as necessary steps to ultimate transforming applications.

Strategic Implications for Community Colleges

While institutions of all types and sizes can expect to experience change as environmental factors intensify and technology advances accelerate, community colleges, perhaps more than any other sector of higher education, may find themselves well positioned for the future. Community colleges led the rest of higher education in confronting and learning to serve nontraditional students with individual needs, and in considering technological solutions for enhancing quality, expanding access, and containing cost by improving productivity. Community colleges, as evidenced by their names, have established firm positions within their communities, initiating collaborations with local business and industry. This strong position should not lead to complacency, however; most community colleges follow relatively closely the 80-20 rule, where perhaps 80 percent of revenues come from 20 percent of the courses offered, leaving the colleges vulnerable to entrepreneurial education providers attempting to cherry-pick the "cash cows" with skillfully marketed competitive offerings. The following

suggested priorities for action may help community colleges to further position themselves for the future.

Learner-Centered Education

Technology facilitates customization of educational offerings, producing learner-centered education. The community college should emphasize increased customization of its offerings to accommodate differences in preparation, learning style, timing of participation, and pacing or duration of the offering.

Technology-based tools can assess level of preparation and learning style and present the course material accordingly. Asynchronous education offerings are made possible by technology meeting the requirements for learner-driven timing of participation and pacing. New student markets will demand certification of skill and content mastery. Community colleges should explore technology-based assessment tools to offer such certification, then direct the student to next-level college offerings).

Active Learning

As experience confirms that active learning exceeds passive lecture and in-class delivery of content in its effectiveness, and that understanding comes from involvement, the community college should employ technology to facilitate:

- exploration and problem-solving, both individual- and team-based, using both information resources and access to masters and experts
- multimedia and multisensory presentations of material to learners
- creation of simulated learning environments such as science laboratories, geographic and economic models, and language-immersion simulators
- student presentations to teacher and fellow students to enable "learning by teaching"
- enhanced class discussion, made possible by electronic availability of study materials
- teamwork, facilitated by technology-based collaboration and groupware tools
- freeing faculty to serve as mentors and coaches, not just content deliverers
- communication outside of class by means of electronic mail between the teacher and the student, among students, and beyond the class to fellow learners

Community Involvement

Some might expect the move to asynchronous learning to inevitably lead to the demise of colleges as physical campuses. Similarly, trends to individual ownership of personal computing and communication devices might suggest reduced investment in shared computer labs. Surely new markets will open, made up of learners who never set foot on a college campus, but strong demand will likely continue for place-based learning to satisfy a need for identity with a social institution. Despite the proliferation of personal computers and network access from anywhere, on or off campus, computer labs continue as some of the busiest facilities on campus. As previously stated, technology trends usually result in significantly increased capability at a fairly constant price rather than a dramatic reduction in the level of investment required for technology, putting personal computer ownership still out of the reach of many prospective learners for a long time to come. While shared computers in labs may have considerably less utility than personally owned computers, and community colleges should strive to put personal computers in the hands of all students, shared computers in labs will continue to have significant value nonetheless. And new software capabilities can now enhance the value of shared computers with features that, upon log on, present a trusted personalized configuration to each individual user, including access to private databases.

Community colleges should consider investment in facilities that can serve as community learning centers in which shared computer labs coexist with docking stations for laptop computers, food outlets, retail stores, libraries, meeting rooms, and study lounges. Such physical facilities can complement the strong links community colleges have (and should expand) with local business and industry.

Technology has often been marketed as a means of removing intermediaries—teachers and librarians, for example, who separate learners from knowledge—allowing unfettered direct access to information. To the contrary, in today's anarchistic information environment intermediaries can perhaps more than ever help learners find their way through oceans of irrelevant electronic information and learning alternatives. A

world with too much information will greatly value the intermediary services of navigation, counseling, and coaching.

Financing Strategies

All too often colleges view technology as a one-time capital expenditure for acquisition of infrastructure, an expenditure that once made will enhance productivity and save money. Instead, technology should represent an opportunity for investment in a strategic asset of the college. As such, an objective up-front assessment can quantify the return expected from the investment in technology. Most colleges find that their investment in technology will initially result in higher rather than lower costs overall, and thus must carefully assess the return on that investment. Colleges should expect continued high levels of investment in infrastructure, with the constant introduction of new technologies offering new and compelling advantages. Even when all faculty, staff, and students have their own networked computers, budgets must anticipate the need to refresh those systems, at least every three years for hardware and every year or two for software. Careful institutionwide planning can help match varying needs with the appropriate level of computing and communication capability, allowing implementation of a program whereby as systems are replaced, the old systems recycle down to users with lower levels of need.

Achieving effective utilization of technology and supporting the growing community of technology users requires significant additional human resources. Support broadly includes initial and ongoing training, installation and maintenance of hardware and software (both initially and as regularly upgraded), help-desk resources to troubleshoot and resolve problems, and especially faculty support to change the teaching and learning process to accommodate technology.

Community colleges appropriately should look not just to capital budgets but to such alternatives as expecting students to bear some of the expense (through student computer purchase or technology fees), and redirecting funds saved by reengineered business processes.

Technology Organization

Perhaps never have we needed an appropriate and effective technology organization more than we do today. With technology affecting every aspect of the college community, each community college should establish an institutionwide strategy for technology to be established and implemented. If the college culture supports it, the president may wish to give overall responsibility for technology to a chief information technology officer or at minimum, to a single, high-level administrator. Administrative computing, academic computing, networking, telecommunications, telephony services, the library, and media services inextricably share linked roles in today's digital age. If not all a part of a single organization, then other means must exist to ensure cooperation and collaboration between and among all these related services. However, the technology organization can not plan and implement the college's technology strategies in isolation; every sector of the campus community has an essential role of active involvement, commitment, and full awareness of the implications of the technology strategies. And just as the technology planning process should involve all sectors of the campus community, the chief information technology officer should participate fully in all institutionwide planning, not just technology-related planning.

Technology Planning

As perhaps the most important step in preparing for the future with regard to technology, each community college should consider initiation of a technology-planning process. While this process can benefit from guidance by a chief information technology officer, it must involve all sectors of the campus community, especially faculty, as a participative, cross-campus process. It must have clear executive commitment and visible support. Often, a number of already existing committees and structures can undertake both technology planning and ongoing technology-related functions such as prioritization in the allocation of resources. The resulting technology plan works best when brief and widely circulated. It should be driven by the college's vision for the future, with technology goals aligned with the college's goals and culture.

Most plans begin with vision and mission statements, emphasizing their alignment

with overall college goals. An assessment of the current environment should include a gap analysis suggesting what steps need to be taken, and when to achieve the vision and mission. Infrastructure plans should include objectives for providing all faculty and staff with desktop computers and ensuring an appropriate ratio of computers available to students. The plan should address regular cycles of refreshing and recycling these computers, and specify universal high-speed connection of all desktop systems to the network, typically through local area networks that connect to a campus backbone and in turn to the global Internet through regional network service providers. Access to the campus network from off-campus sites has become an important factor as well, whether through dial-up capability directly into the network or through outsourcing to a local Internet service provider. The infrastructure plan should include specifications for technology-ready classrooms, and, where needed, for portable technology to be used in other classrooms.

A technology plan for administrative computing should address such considerations as how quickly to move to client-server computing based on open systems standards to take advantage of capabilities at both the desktop and server platform levels. It should include general guidelines for in-house development or acquisition of commercial systems; community colleges today usually find it more cost effective to buy proprietary administrative software than to develop it internally. The plan should further address what extent of proprietary software modification is appropriate, weighing the necessity of changing business practices to match the software or bearing the considerable expense to modify and maintain proprietary systems to accommodate current practices. A willingness to consider reengineering business practices not only can prove more cost effective when installing administrative software but also can lead to significantly streamlined services. Many community colleges will want to consider the use of some type of data warehousing technique to separate production administrative systems from decision-support queries.

Academic computing plans should address the functionality needed to support new learning systems, including delivery of multimedia to classrooms, supporting communication between faculty and students and among students outside of class, supporting customized asynchronous learning, making available groupware for collaboration and teamwork, and providing Web access to library and media services resources (whether on campus or remote). Community colleges, which typically can not afford to build as extensive libraries on site as four-year institutions, may begin to find themselves now able to compete effectively by providing access to these information resources electronically. Finally, an academic computing technology plan should address the development and/or acquisition of the learningware itself, with related supportive multimedia content.

The area of student services falls somewhere between academic and administrative computing and represents an important consideration for a technology plan. Just as learning can be conducted asynchronously, so can student support, from registration to grade reporting to advising to provision of general information by means of a campuswide information system, including the answers to frequently asked questions.

Many community colleges underestimate the magnitude of human resources needed to adequately support the entire campus community in its expanding use of technology. As faculty, staff, and students increase their use of technology, support requirements will escalate exponentially, well beyond the capabilities of most central technology organizations. Technology plans should address strategies for multiple levels of support, including help desks and the use of personnel in both academic and administrative departments as an extended support organization. For many faculty, changing to a teaching style that incorporates technology represents a difficult transition, with intensive training necessary to succeed in this endeavor.

Finally, a technology plan should address funding and financing alternatives, paying careful attention to ongoing, not just one-time, funding and financing.

Resources

Related resources may be obtained through the EDUCAUSE Web site: www.educause.edu.

AACC ACCT

This paper was commissioned for the New Expeditions project, a joint effort of the American Association of Community Colleges and the Association of Community College Trustees, funded by the W. K. Kellogg Foundation. New Expeditions aims to set a strategic direction for the nation's community colleges for the first part of the 21st century. Relying on input from the field and critical analysis of trends, the project will culminate in a visionary report challenging the colleges with a series of recommendations for action. For more information about the New Expeditions project, visit the American Association of Community Colleges Web site: www.aacc.nche.edu/initiatives/newexpeditions or contact AACC headquarters.

American Association of Community Colleges
One Dupont Circle, NW, Suite 410
Washington, DC 20036
www.aacc.nche.edu

© 2000 American Association of Community Colleges. Photocopying for educational and information purposes is permitted. To purchase the set of 12 New Expeditions issues papers, please contact

Community College Press
P.O. Box 311
Annapolis Junction, Maryland 20701-0311
Phone: (800) 250-6557
Fax: (301) 604-0158
E-mail: aaccpub@pmds.com
Order # 1523

New Expeditions Issues Papers

- Student Access in Community Colleges
- Reexamining the Community College Mission
- Fulfilling the Promise of Access and Opportunity: Collaborative Community Colleges for the 21st Century
- Public Community College Faculty
- Community College Financing: Strategies and Challenges
- Contradictory Colleges: Thriving in an Era of Continuous Change
- Issues in Community College Governance
- Community College Leadership in the New Millennium
- The Search for the Learning-Centered College
- Technology and the Future of the Community College
- Community Colleges and Career Qualifications
- Charting the Future of Global Education in Community Colleges

BEST COPY AVAILABLE